DETAILED ACTION

Response to Amendment

1.   This office action is in response to the applicants' After Non-Final Amendment filed on

January 9, 2008. *Claims 28-68* are presented for further consideration and examination.

Claim Rejections - 35 USC § 103

2.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set
forth in section 102 of this title, if the differences between the subject matter sought to be patented and
the prior art are such that the subject matter as a whole would have been obvious at the time the
invention was made to a person having ordinary skill in the art to which said subject matter pertains.
Patentability shall not be negatived by the manner in which the invention was made.

3.   <u>Claims 28, 45, and 56</u> are rejected under 35 U.S.C. 103(a) as being unpatentable over

Kleiman et al. (US006574591B1) and in view of Kleiman et al. (US006604118B2).

4.   With regard to <u>*claims 28, 45, and 56*</u>, Kleiman '591 discloses,

- *discovering logical information related to the one or more volumes of data that*

  are part of the first volume group on the first computer system; (Kleiman '591,

  col.1, line 10 – col.13, line 60)

  Kleiman discloses, *"One preferred embodiment determines a first set of block*

  numbers (BNs), determines where the storage blocks referenced by these BNs

  are to be stored, and updates the BNs accordingly" (Kleiman '591, col.1, lines 61-

  64). Hence, Kleiman teaches of determining (i.e., Applicants' discovering) a first

set of block numbers (BNs) (i.e., Applicants' logical information). Kleiman

discloses, *"A preferred embodiment uses BNs that are within a volume block*

number (VBN) space. VBNs provide a contiguous flat address space for the

storage blocks" (Kleiman '591, col.4, lines 38-40). Hence, Kleiman teaches of

the BNs (i.e., Applicants' logical information) belonged (i.e., Applicants' related)

within a volume block number (VBN) space (i.e., Applicants' one or more

volumes of data that are part of the first volume group).

- *creating a map of the logical information to physical devices on the first computer*

  system, the map comprising: (Kleiman '591, col.1, line 10 – col.13, line 60)

  Kleiman discloses, *"The `generate image stream` procedure 203 may also*

  generate one or more block-lists that specify where storage blocks from the

  source file system are included in the image stream. The block-lists can indicate

  which storage blocks include one or more block number (BN) pointers. The data

  read from the source file system includes one or more block number (BN)

  pointers. The `generate image stream` procedure 203 can also include a second

  block-list that can be used to map blocks in the image stream to a second

  storage block arrangement for the destination file system" (Kleiman '591, col.5,

  lines 6-15). Hence, Kleiman teaches of block-lists (i.e., Applicants' map)

  indicating which storage blocks from the source file system (i.e., Applicants'

  physical devices on the first computer) are associated with the one or more block

  number (BN) pointers (i.e., Applicants' logical information).

  - *information identifying one or more devices associated with one or more*

    physical volumes containing the data; and (Kleiman '591, col.1, line 10 –

    col.13, line 60)

Kleiman discloses, *"The block-lists can indicate which storage blocks include one or more block number (BN) pointers. The data read from the source file system includes one or more block number (BN) pointers"* (Kleiman '591, col.5, lines 9-12). Kleiman discloses, *"A preferred embodiment uses BNs that are within a volume block number (VBN) space. VBNs provide a contiguous flat address space for the storage blocks"* (Kleiman '591, col.4, lines 38-40). Hence, Kleiman teaches of block-lists (i.e., Applicants' map) containing information associating the storage blocks (i.e., Applicants' physical devices) with the volume block number space (i.e., Applicants' one or more physical volumes).

- *information providing definition and structured layout of volume groups, internal logical volumes and file systems on the first computer system;* (Kleiman '591, col.1, line 10 – col.13, line 60)

Kleiman discloses, *"Another preferred embodiment reads data from the source file system (in accordance with a first storage block arrangement) creates an image stream"* (Kleiman '591, col.1, lines 64-66). Kleiman discloses, *"A preferred embodiment uses BNs that are within a volume block number (VBN) space. VBNs provide a contiguous flat address space for the storage blocks"* (Kleiman '591, col.4, lines 38-40). Hence, Kleiman teaches of reading data from the source (i.e., Applicants' first computer system) file system in accordance with a first storage block arrangement (i.e., Applicants' internal logical volumes and file systems) and volume block number space (i.e., Applicants' structured layout of volume groups).

- *using the map to create a second volume group on a second computer system having a second operating system, where the logical configuration of the second volume group is substantially identical to the logical configuration of the first volume group; and* (Kleiman '591, col.1, line 10 – col.13, line 60)

    Kleiman discloses, *"Another preferred embodiment reads data from the source file system (in accordance with a first storage block arrangement) creates an image stream and writes the data from the image stream onto the destination file system (in accordance with a second storage block arrangement)"* (Kleiman '591, col.1, line 64 col.2, line 2). Hence, Kleiman teaches of reading data from the source (i.e., Applicants' first computer system) file system in accordance with a first storage block arrangement (i.e., Applicants' internal logical volumes and file systems) and writing the data from the image stream onto the destination (i.e., Applicants' second computer system) file system in accordance with a second storage block arrangement.

However, Kleiman '591 does not explicitly disclose,

- *using the map to* create a second volume group on a second computer system having a second operating system, *where the logical configuration of the second volume group is substantially identical to the logical configuration of the first volume group; and*

- *using the map to reconstruct on the second computer system the internal logical volumes and file systems of the first computer system and mount a duplicate of the one or more volumes of data on the second computer system.*

Kleiman '118 teaches,

- *using the map to <u>create a second volume group on a second computer system</u>*

  <u>having a second operating system,</u> where the logical configuration of the second

  volume group is substantially identical to the logical configuration of the first

  volume group; and (Kleiman '118, col.1, line 5 – col.17, line 62)

  Kleiman discloses, *"Select a storage image 220, in response to a first file system*

  (or a snapshot thereof) to have an operation performed thereon. Form an image

  stream 230 in response to the storage image 220. Perform an operation on the

  image stream 230, such as backup or restore within the first file system, or

  copying or transfer to a second file system" (Kleiman '118, col.14, lines 10-18).

  Hence, Kleiman teaches of selecting a storage image (i.e., Applicants' first

  volume group) of the first file system (i.e., Applicants' first file system) and

  copying or transferring (i.e., Applicants' creating) to a second file system (i.e.,

  Applicants' second operating system) on a second file server.

- *using the map to reconstruct on the second computer system the internal logical*

  volumes and file systems of the first computer system and mount a duplicate of

  the one or more volumes of data on the second computer system. (Kleiman '118,

  col.1, line 5 – col.17, line 62)

  Kleiman discloses, *"Select a storage image 220, in response to a first file system*

  (or a snapshot thereof) to have an operation performed thereon. Form an image

  stream 230 in response to the storage image 220. Perform an operation on the

  image stream 230, such as backup or restore within the first file system, or

  copying or transfer to a second file system" (Kleiman '118, col.14, lines 10-18).

  Hence, Kleiman teaches of selecting a storage image (i.e., Applicants' first

  volume group) of the first file system (i.e., Applicants' first file system) and

copying or transferring (i.e., Applicants' creating) to a second file system (i.e., Applicants' second operating system) on a second file server.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention was made to combine the teachings of Kleiman '118 with the teachings of Kleiman '591 to *"[provide] techniques for duplicating all or part of a file system while maintaining consistent copies of the file system"* (Kleiman '591, col.1, lines 59-61). Kleiman discloses, *"Accordingly, it would be desirable to provide a method and system for duplicating all or part of a file system, which can operate with any type of storage medium without either relative complexity or expense, and which can provide all the known functions for data backup and restore. This advantage is achieved in an embodiment of the invention in which consistent copies of the file system are maintained, so those consistent snapshots can be transferred at a storage block level using the file server's own block level operations"* (Kleiman '118, col.1, lines 37-46).

5.   *Claims 29-44, 46-55, and 57-68* are rejected under 35 U.S.C. 103(a) as being unpatentable over Kleiman et al. (US006574591B1), in view of Kleiman et al. (US006604118B2), and further in view of Markson et al. (US 20020103889A1).

6.   With regard to *claims 29-30*, Kleiman '591 and Kleiman '118 disclose,

See *claim 28* rejection as detailed above.

However, Kleiman '591 and Kleiman '118 do not explicitly disclose,

- *wherein the first and second operating system are selected from the group consisting of IBM AIX, Sun Solaris, or HP UX, and the computer-executed steps may be performed substantially independent of which operating system is selected from the group.*
- *wherein the map is configured as a flat file that is converted into a tree structure and further comprising the computer-executed step of using the tree structure to verify the accuracy of the information related to the volume group and the other logical information.*

Markson teaches,

- *wherein the first and second operating system are selected from the group consisting of IBM AIX, Sun Solaris, or HP UX, and the computer-executed steps may be performed substantially independent of which operating system is selected from the group.* (Markson, para.84)
- *wherein the map is configured as a flat file that is converted into a tree structure and further comprising the computer-executed step of using the tree structure to verify the accuracy of the information related to the volume group and the other logical information.* (Markson, para.83-84, 89, 94)

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention was made to combine the teachings of Markson with the teachings of Kleiman '591 and Kleiman '118 to *"[provide] techniques for duplicating all or part of a file system while maintaining consistent copies of the file system"* (Kleiman '591, col.1, lines 59-61). Kleiman discloses, *"Accordingly, it would be desirable to provide a method and system for duplicating all or part of a file system, which can operate with any type of storage medium without either relative complexity or expense, and*

which can provide all the known functions for data backup and restore. This

advantage is achieved in an embodiment of the invention in which consistent copies

of the file system are maintained, so those consistent snapshots can be transferred

at a storage block level using the file server's own block level operations" (Kleiman

'118, col.1, lines 37-46). Markson discloses, "Still another problem in this context

relates to making back-up copies of data on the storage devices. It would be

cumbersome and time-consuming for an operator of a data center to move among

multiple data storage locations in order to accomplish a periodic back-up of data

stored in the data storage locations. Thus there is a need for a way to provide

storage that can be selectively associated with and disassociated from a virtual

server farm and also backed up in a practical manner" (Markson, para.11).

7.   With regard to _claims 31-32_, Kleiman '591, Kleiman '118, and Markson disclose,

   - _wherein the tree structure is converted back into a map that is sent to the second_

      computer system. (Kleiman '591, col.1, line 10 – col.13, line 60; Kleiman '118,

      col.1, line 5 – col.17, line 62; Markson, para.1-214)

   - _further comprising the computer-executed step of building a second volume_

      group on the second computing system that is a substantial copy of the first

      volume group on the first computing system including volume layout and file

      system structure as defined by mapping information originally built on the first

      computer system. (Kleiman '591, col.1, line 10 – col.13, line 60; Kleiman '118,

      col.1, line 5 – col.17, line 62; Markson, para.1-214)

8.   With regard to _claims 33-36_, Kleiman '591, Kleiman '118, and Markson disclose,

- *further comprising the computer-executed steps of:*

  - *establishing one or more mirrored copies of data that are copies of one or more volumes of data that are part of the first volume group; and* (Kleiman '591, col.1, line 10 – col.13, line 60; Kleiman '118, col.1, line 5 – col.17, line 62; Markson, para.1-214)

  - *separating the one or more mirrored copies of data from the respective one or more volumes of data.* (Kleiman '591, col.1, line 10 – col.13, line 60; Kleiman '118, col.1, line 5 – col.17, line 62; Markson, para.1-214)

- *further comprising the computer-executed step of mounting the separated one or more mirrored copies of data on the first or second computer system using the second volume group.* (Kleiman '591, col.1, line 10 – col.13, line 60; Kleiman '118, col.1, line 5 – col.17, line 62; Markson, para.1-214)

- *wherein the first and second computer system are combined.* (Kleiman '591, col.1, line 10 – col.13, line 60; Kleiman '118, col.1, line 5 – col.17, line 62; Markson, para.1-214)

- *further comprising the computer-executed step of:*

  - *dismounting the separated one or more mirrored copies from the second computer system.* (Kleiman '591, col.1, line 10 – col.13, line 60; Kleiman '118, col.1, line 5 – col.17, line 62; Markson, para.1-214)

9.   With regard to *claims 37-38*, Kleiman '591, Kleiman '118, and Markson disclose,

- *further comprising the computer-executed step of:*

- ▪ *backing up the separated one or more mirrored copies of data to a backup medium.* (Kleiman '591, col.1, line 10 – col.13, line 60; Kleiman '118, col.1, line 5 – col.17, line 62; Markson, para.1-214)

- • *further comprising the computer-executed step of:*

  - ▪ *restoring one or more volumes of data from the backup medium or from the one or more mirrored copies of data that are copies of the one or more volumes of data.* (Kleiman '591, col.1, line 10 – col.13, line 60; Kleiman '118, col.1, line 5 – col.17, line 62; Markson, para.1-214)

10.   With regard to *claims 39-44*, Kleiman '591, Kleiman '118, and Markson disclose,

- • *wherein the respective one or more volumes of data that are part of a first volume group on the first computer system are further associated with a first software application.* (Kleiman '591, col.1, line 10 – col.13, line 60; Kleiman '118, col.1, line 5 – col.17, line 62; Markson, para.1-214)

- • *wherein a second software application is provided on the second computer system and the separated one or more mirrored copies of data on the second computer system are associated with the second software application.* (Kleiman '591, col.1, line 10 – col.13, line 60; Kleiman '118, col.1, line 5 – col.17, line 62; Markson, para.1-214)

- • *further comprising the computer-executed step of:*

  - ▪ *backing up the separated one or more mirrored copies of data to a backup medium.* (Kleiman '591, col.1, line 10 – col.13, line 60; Kleiman '118, col.1, line 5 – col.17, line 62; Markson, para.1-214)

- *wherein the second software application has an associated database and the step of backing up the separated one or more mirrored copies of data to a backup medium includes backing up the associated database. (Kleiman '591, col.1, line 10 – col.13, line 60; Kleiman '118, col.1, line 5 – col.17, line 62; Markson, para.1-214)*

- *wherein there is a set of information associated with the database, the set of information comprising at least one type of information selected from the group consisting of tablespaces, archive logs, redo logs, and control files, and wherein at least some of the set of information associated with the database is backed up to the backup medium during the backup step. (Kleiman '591, col.1, line 10 – col.13, line 60; Kleiman '118, col.1, line 5 – col.17, line 62; Markson, para.1-214)*

- *further comprising the step of:*

  - *restoring, from the separated one or more mirrored copies of data, the respective one or more volumes of data associated with the separated one or more mirrored copies of data, and wherein at least some of the set of information associated with the database is used during this step. (Kleiman '591, col.1, line 10 – col.13, line 60; Kleiman '118, col.1, line 5 – col.17, line 62; Markson, para.1-214)*

11.   With regard to *claims 46-55*, they are rejected with the same rational as claims 29-38, because they have similar limitations as claims 29-38.

12.   With regard to *claims 57-58 and 67-68*, Kleiman '591, Kleiman '118, and Markson disclose,

- *wherein the map further comprises: information identifying the one or more separated mirrored copies of the data; and information identifying the physical address(es) of the mirrored copies.* (Kleiman '591, col.1, line 10 – col.13, line 60; Kleiman '118, col.1, line 5 – col.17, line 62; Markson, para.1-214)

- *wherein the first operating system is different from the second operating system.* (Kleiman '591, col.1, line 10 – col.13, line 60; Kleiman '118, col.1, line 5 – col.17, line 62; Markson, para.1-214)

13.   With regard to *claims 59-63*, Kleiman '591, Kleiman '118, and Markson disclose,

- *wherein the map further comprises at least one set of information selected from the group consisting of information relating to one or more filesystems associated with the volumes of data, device serial number, physical address, volume group, logical volume name, file type, and mount point.* (Kleiman '591, col.1, line 10 – col.13, line 60; Kleiman '118, col.1, line 5 – col.17, line 62; Markson, para.1-214)

- *wherein the first operating system is different from the second operating system.* (Kleiman '591, col.1, line 10 – col.13, line 60; Kleiman '118, col.1, line 5 – col.17, line 62; Markson, para.1-214)

- *wherein the first operating system is substantially the same as the second operating system.* (Kleiman '591, col.1, line 10 – col.13, line 60; Kleiman '118, col.1, line 5 – col.17, line 62; Markson, para.1-214)

- *wherein the first computer system is a separate and distinct computer system from the second computer system.* (Kleiman '591, col.1, line 10 – col.13, line 60; Kleiman '118, col.1, line 5 – col.17, line 62; Markson, para.1-214)

- *further comprising creating volume group, logical volume, and file system objects on the second computer system.* (Kleiman '591, col.1, line 10 – col.13, line 60; Kleiman '118, col.1, line 5 – col.17, line 62; Markson, para.1-214)

14.   With regard to <u>claims 64-66</u>, Kleiman '591, Kleiman '118, and Markson disclose,

- *wherein the map further comprises: information identifying the one or more separated mirrored copies of the data; and information identifying the physical address(es) of the mirrored copies.* (Kleiman '591, col.1, line 10 – col.13, line 60; Kleiman '118, col.1, line 5 – col.17, line 62; Markson, para.1-214)

- *wherein the first operating system is different from the second operating system.* (Kleiman '591, col.1, line 10 – col.13, line 60; Kleiman '118, col.1, line 5 – col.17, line 62; Markson, para.1-214)

- *wherein the first operating system is substantially the same as the second operating system.* (Kleiman '591, col.1, line 10 – col.13, line 60; Kleiman '118, col.1, line 5 – col.17, line 62; Markson, para.1-214)

Response to Arguments

15.   Applicant's arguments with respect to *claims 28, 45, and 56* have been considered but they are not persuasive.

16.   With regard to <u>claims 28, 45, and 56</u>, the Applicants point out that:

- *The applied art is not understood to disclose or to suggest the foregoing features of claim 28. The Examiner contends that Kleiman '591 teaches all the limitations of claim 28 except the italicized portions of claim 28; namely:*

> - *(1) using the map to create a second volume group on a second computer system having a second operating system, <u>where the logical configuration of the second volume group is substantially identical to the logical configuration of the first volume group; and</u>*

However, the Examiner finds that the Applicants' arguments are not persuasive because Kleiman discloses, *"Another preferred embodiment reads data from the source file system (in accordance with a first storage block arrangement) creates an image stream and writes the data from the image stream onto the destination file system (in accordance with a second storage block arrangement)"* (Kleiman '591, col.1, line 64 col.2, line 2). Hence, Kleiman teaches of reading data from the source (i.e., Applicants' first computer system) file system in accordance with a first storage block arrangement (i.e., Applicants' internal logical volumes and file systems) and writing the data from the image stream onto the destination (i.e., Applicants' second computer system) file system in accordance with a second storage block arrangement.

17.   With regard to <u>*claims 28, 45, and 56*</u>, the Applicants point out that:

- *The applied art is not understood to disclose or to suggest the foregoing features of claim 28. The Examiner contends that Kleiman '591 teaches all the limitations of claim 28 except the italicized portions of claim 28; namely:*

  > - *(2) using the map to reconstruct on the second computer system the internal logical volumes and file systems of the first computer system and mount a duplicate of the one or more volumes of data on the second computer system.*

However, the Examiner finds that the Applicants' arguments are not persuasive

because the Examiner did not rely on Kleiman '591 as the basis for the rejection of

the limitation (2). Please see the rejection as detailed above.

18.   With regard to *claims 28, 45, and 56*, the Applicants point out that:

- *Not only does Kleiman '591 not teach limitations (1) and (2) above, but, further,*
  Applicants point out that Kleiman '591 teaches directly away from the above two
  limitations. Indeed, Kleiman '591 repeatedly teaches directly and expressly away
  from any type of limitation where a logical configuration of a first and second
  group are identical or substantially identical For example, Kleiman '591 first
  states at col. 1, lines 50-55 [emphasis added].

However, the Examiner finds that the Applicants' arguments are not persuasive

because claim 28 states, *"using the map to create a second volume group on a*

second computer system having a second operating system, where the logical

configuration of the second volume group is substantially identical to the logical

configuration of the first volume group; and"; and, from which, the Examiner

interprets the limitation of *"substantially identical"* to suggest that the two logical

configurations are not the same (in other words, the two logical configurations are

different).

19.   With regard to *claims 28, 45, and 56*, the Applicants point out that:

- *Claim 28 requires that the first and second volume groups have the same logical*
  configuration, whereas Kleiman '591 expressly recites that the block
  arrangements are intended to be different.

However, the Examiner finds that the Applicants' arguments are not persuasive
because the arguments do not commensurate with the claim language. Claim 28,
actually, states, *"using the map to create a second volume group on a second*
computer system having a second operating system, where the logical configuration
of the second volume group is substantially identical to the logical configuration of
the first volume group; and"; and, from which, the Examiner interprets the limitation
of *"substantially identical"* to suggest that the two logical configurations are not the
same (in other words, the two logical configurations are different).

20.   With regard to <u>claims 28, 45, and 56</u>, the Applicants point out that:

- *In an attempt to compensate for the deficiencies of the Kleiman '591 reference,*
  the Examiner relies on Kleiman ' 118. The Examiner cites the following passage
  of Kleiman ' 118 as allegedly teaching both the limitations (1) and (2) above that
  are admittedly not taught in Kleiman '591"

However, the Examiner finds that the Applicants' arguments are not persuasive
because the Examiner did not rely on Kleiman '118 as the basis for the rejection of
the highlighted portion of limitation (1). Please see the rejection as detailed above.

21.   With regard to <u>claims 28, 45, and 56</u>, the Applicants point out that:

- *Thus, Kleiman ' 118 merely references copying a first file system to a second file*
  system. As those of skill in the art are well aware, however, file systems are not
  the same thing as volume groups and logical volume information.

However, the Examiner finds that the Applicants' arguments are not persuasive
because Kleiman discloses, *"Select a storage image 220, in response to a first file*

system (or a snapshot thereof) to have an operation performed thereon. Form an

image stream 230 in response to the storage image 220. Perform an operation on

the image stream 230, such as backup or restore within the first file system, or

copying or transfer to a second file system" (Kleiman '118, col.14, lines 10-18).

Hence, Kleiman teaches of selecting a storage image (i.e., Applicants' first volume

group) of the first file system (i.e., Applicants' first file system) and copying or

transferring (i.e., Applicants' creating) to a second file system (i.e., Applicants'

second operating system) on a second file server.

Conclusion

22.   **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the

extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE

MONTHS from the mailing date of this action. In the event a first reply is filed within

TWO MONTHS of the mailing date of this final action and the advisory action is not

mailed until after the end of the THREE-MONTH shortened statutory period, then the

shortened statutory period will expire on the date the advisory action is mailed, and any

extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the

advisory action. In no event, however, will the statutory period for reply expire later than

SIX MONTHS from the date of this final action.

23.   Any inquiry concerning this communication or earlier communications from the examiner

should be directed to Thomas Duong whose telephone number is 571/272-3911. The

examiner can normally be reached on M-F 7:30AM - 4:00PM. If attempts to reach the

examiner by telephone are unsuccessful, the examiner's supervisor, Jason D. Cardone can be reached on 571/272-3933. The fax phone numbers for the organization where this application or proceeding is assigned are 571/273-8300 for regular communications and 571/273-8300 for After Final communications.

Thomas Duong (AU2145)

April 16, 2008

/Jason D Cardone/
Supervisory Patent Examiner, Art Unit 2145